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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	09/865,732	YAMAGUCHI ET AL.
	Examiner	Art Unit
	Russ Guill	2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 May 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to the Amendment filed March 20, 2007. No claims have been added or canceled. Claims 1 – 12 have been examined. Claims 1 – 12 have been rejected.

2. **As recited previously, the Examiner would like to thank the Applicant for the well-presented response, which assisted in the examination process. The Examiner appreciates the effort to analyze the Office Action, and make appropriate arguments and amendments.**

Response to Remarks

3. Regarding claim 8 objected to for minor informalities:

3.1. The claim amendment overcomes the objection.

4. Regarding claims 11 - 12 rejected under 35 USC § 112, second paragraph:

4.1. Applicant's amendments to the claims overcome the rejections.

5. Regarding claims 1 - 12 rejected under 35 USC § 101:

5.1. The Applicant's arguments have been fully considered, but are not persuasive, as follows. Accordingly, the rejections are maintained.

5.2. The Applicant argues:

5.3. **The Examiner alleges that the claims recite merely an abstract idea. Independent claims 1 and 6-12 recite the feature of "outputting the receiving characteristic," and independent claim 5 recites the feature of "outputting the directivity characteristic." The mere result of outputting a "characteristic" for a simulation apparatus provides a useful, concrete, and tangible result. Claims 1 and 5-12**

recite either a simulation apparatus for simulating, a computer-readable storage medium on which is recorded a program process for controlling and enabling a computer to simulate, a process of simulating, or a method of simulating within the technological arts, thereby providing a useful, concrete, and tangible result.

5.3.1.1. The Examiner respectfully replies:

5.3.1.2. The claims are rejected because they do not produce a practical application having a concrete, useful and tangible result, rather than because they recite merely an abstract idea. The mere result of outputting does not appear to necessarily produce a useful, concrete and tangible result because outputting could be broadly interpreted to simply be producing a result of a calculation. Although a claim may have tangible elements, the result of the claim must be useful, concrete and tangible.

5.4. The Applicant argues:

5.5. **MPEP § 2106 states that subject matter outside patentable statutory subject matter is limited to abstract ideas, laws of nature, and natural phenomena, where the claimed subject matter is not a practical *application* or use of an idea, a law of nature or a natural phenomena. Thus, a claim to an "abstract idea" is non-statutory when it does not represent a practical application of the idea. A claim is limited to a practical application when the method, as claimed, produces a concrete, tangible and useful result (see, MPEP § 2106).**

5.6. **As recited in independent claim 1, for example, the simulation apparatus comprises an output device which calculates a receiving characteristic of an object and then outputs the receiving characteristic of the object. A simulation device is known to produce or output a result. Accordingly, a concrete, tangible and useful result is achieved not only by calculating a receiving characteristic of an object but also by outputting the receiving characteristic of the object.**

(see, <u>State Street Bank & Trust Co. v. Signature Financial Group inc.,</u> 47 U.S.P.O.2d 1596 (Fed. Cir. 1998)).

5.6.1.1. The Examiner respectfully replies:

5.6.1.2. Although a simulation device is known to produce or output a result, it does not necessarily output a result, or output a useful, concrete and tangible result. Since the output device is recited as performing calculation, the output device appears to be a processor, and the output could be broadly interpreted as simply producing a result of a calculation. Further, in the recited State Street case, the claim was construed to include writing the results to a file, which does not appear to apply to claim 1.

6. Regarding claims 1 - 12 rejected under 35 USC § 103:

6.1. The Applicant's arguments have been fully considered, but are not persuasive, as follows. Accordingly, the rejections are maintained.

6.2. The Applicant argues:

6.3. **However, <u>Nishino</u> does not disclose or suggest a generation source and object. In this regard, it is unlikely that any person skilled in the art would find that Nishino discloses the claimed first current calculation device and second current calculation device as recited, for example, in claim 1 of the present invention.**

6.3.1. The Examiner respectfully replies:

6.3.2. Nishino appears to clearly teach a generation source and an object. The invention of Nishino calculates the electromagnetic field radiated from an electronic circuit (Abstract), which immediately teaches a generation source. The invention of Nishino calculates wave sources induced by a current source in an inapplicable

section (such as a housing of an electronic device) (column 2, lines 11 – 25), so the inapplicable section, such as a housing, is an object that receives a radio wave (and further acts as a radio wave source itself).

6.4. The Applicant argues:

6.5. In sections 11.5.1 and 11.5.3 on pages 11 and 12 of the Office Action, the Examiner attempts to describe that Nishino discloses a first current calculation device and second current calculation device, yet, nothing in Nishino discloses or suggests the features of "a first current calculation device calculating current values of the generation source using simultaneous equations of the generation source when the generation source is divided into a plurality of elements, the simultaneous equations of the generation source having currents that flow through respective elements as unknowns" and "a second current calculation device calculating current values of the object using simultaneous equations of the object when the object is divided into a plurality of elements and a positional relationship between the generation source and object changes, the simultaneous equations of the object having currents that flow through respective elements as unknowns and the current values stored in the current storage device as constants.

6.5.1. The Examiner respectfully replies:

6.5.2. In summary, as described in the rejection below, the instant invention appears to be simply an implementation of the method of Cheng using the well-known method of moments (described in Nishino), which would have been obvious to the ordinary artisan at the time of invention. Cheng further teaches that a positional relationship changes between the generation source and the receiving object (page 632, figure 11-16).

6.5.3. Claim 1 is rejected under 35 USC § 103, and the art of Nishino is combined with the art of Cheng and Otsu to teach claim 1. The combination is described in the rejection of claim 1 below.

6.6. The Applicant argues:

6.7. In section 6.2.1.2 on page 3 of the Office Action, the Examiner asserts, "the ordinary artisan would have known that the calculation method of the claims would only be applicable if a distance between a transmitting antenna (a source) and a EUT (an object) is greater than or equal to a threshold distance because Chang recites that the transmitting and receiving antennas need to be separated by very large distances in order for the coupling impedance to be neglected as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna." The Examiner further asserts, "[t]he ordinary artisan would have known about the far field approximation of the equations of electromagnetic radiation . . ., as opposed to the near field equations. The near field equations contain terms proportional to $1/R^2$ and $1/R^3$, which can be ignored when R Is large . . ., which would have been known by the ordinary artisan. Therefore, the ordinary artisan would have used a distance threshold to determine if it was appropriate to use a far field approximation."

6.8. The Examiner's comments, however, fail to address our arguments that <u>Chang</u>, either alone or in combination with any of the cited prior art references, does not describe the features of the present invention in which a check is made to determine whether a distance between a transmitting antenna (a source) and a EUT (an object) Is greater than or equal to a prescribed threshold distance. Nothing in <u>Chang</u> describes that if a threshold is met, the calculation of source current values using a first set of simultaneous equations and the storing of these current values as constants is performed.

6.8.1. The Examiner respectfully replies:

6.8.2. It would have been obvious to the ordinary artisan at the time of invention that a check is made to determine whether a distance between a transmitting antenna and an EUT is greater than or equal to a prescribed threshold distance because Cheng recites that the transmitting and receiving antennas need to be separated by very large distances in order for the coupling impedance to be neglected as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna, and therefore, there would have been a check for separation distance between the source and the receiving object to ensure that the equations were applicable. The ordinary artisan would have used a distance threshold to determine if it was appropriate to use a far field approximation.

Claim Rejections - 35 USC § 101

7. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7.1. **Claims 1 - 12** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

7.2. Regarding independent **claim 1 and dependent claims 2 - 4**, the recited simulation apparatus appears to contain abstract ideas such as calculating current values. Therefore, in order to be statutory, the claim must be directed to a practical application producing a concrete, useful and tangible result. The claim does not appear to produce a tangible result needed to support a practical application. The act of "outputting the receiving characteristic" does not appear to necessarily produce a tangible result. The act of "outputting the receiving characteristic" could

be interpreted as simply calculating the value of a result. When a claim can be broadly interpreted to include both statutory and non-statutory material, the claim must be rejected.

7.3. Regarding independent **claim 5**, the recited simulation apparatus appears to contain abstract ideas such as calculating current values. Therefore, in order to be statutory, the claim must be directed to a practical application producing a concrete, useful and tangible result. The claim does not appear to produce a tangible result needed to support a practical application. The act of "outputting the directivity characteristic" does not appear to necessarily produce a tangible result. The act of "outputting the directivity characteristic" could be interpreted as simply producing a result of a calculation. When a claim can be broadly interpreted to include both statutory and non-statutory material, the claim must be rejected.

7.4. Regarding independent **claim 6**, the recited simulation apparatus appears to contain abstract ideas such as calculating current values. Therefore, in order to be statutory, the claim must be directed to a practical application producing a concrete, useful and tangible result. The claim does not appear to produce a tangible result needed to support a practical application. The act of "outputting the receiving characteristic" does not appear to necessarily produce a tangible result. The act of "outputting the receiving characteristic" could be interpreted as simply producing a result of a calculation. When a claim can be broadly interpreted to include both statutory and non-statutory material, the claim must be rejected.

7.5. Regarding independent **claim 7**, the recited program process appears to contain abstract ideas such as calculating current values. Therefore, in order to be statutory, the claim must be directed to a practical application producing a concrete, useful and tangible result. The claim does not appear to produce a tangible result needed to support a practical application. The act

of "outputting the receiving characteristic" does not appear to necessarily produce a tangible result. The act of "outputting the receiving characteristic" could be interpreted as simply producing a result of a calculation. When a claim can be broadly interpreted to include both statutory and non-statutory material, the claim must be rejected.

7.6. Regarding independent **claims 8**, the recited process appears to contain abstract ideas such as calculating current values. Therefore, in order to be statutory, the claim must be directed to a practical application producing a concrete, useful and tangible result. The claim does not appear to produce a tangible result needed to support a practical application. The act of "outputting the receiving characteristic" does not appear to necessarily produce a tangible result. The act of "outputting the receiving characteristic" could be interpreted as simply producing a result of a calculation. When a claim can be broadly interpreted to include both statutory and non-statutory material, the claim must be rejected.

7.7. Regarding independent **claim 9**, the recited method appears to contain abstract ideas such as calculating current values. Therefore, in order to be statutory, the claim must be directed to a practical application producing a concrete, useful and tangible result. The claim does not appear to produce a tangible result needed to support a practical application. The act of "outputting the receiving characteristic" does not appear to necessarily produce a tangible result. The act of "outputting the receiving characteristic" could be interpreted as simply producing a result of a calculation. When a claim can be broadly interpreted to include both statutory and non-statutory material, the claim must be rejected.

7.8. Regarding independent **claim 10**, the recited simulation apparatus appears to contain abstract ideas such as calculating current values. Therefore, in order to be statutory, the claim must be

directed to a practical application producing a concrete, useful and tangible result. The claim does not appear to produce a tangible result needed to support a practical application. The act of "outputting the receiving characteristic" does not appear to necessarily produce a tangible result. The act of "outputting the receiving characteristic" could be interpreted as simply producing a result of a calculation. When a claim can be broadly interpreted to include both statutory and non-statutory material, the claim must be rejected.

7.9. Regarding independent **claim 11**, the recited simulation apparatus appears to contain abstract ideas such as calculating current values. Therefore, in order to be statutory, the claim must be directed to a practical application producing a concrete, useful and tangible result. The claim does not appear to produce a tangible result needed to support a practical application. The act of "outputting the receiving characteristic" does not appear to necessarily produce a tangible result. The act of "outputting the receiving characteristic" could be interpreted as simply producing a result of a calculation. When a claim can be broadly interpreted to include both statutory and non-statutory material, the claim must be rejected.

7.10. Regarding independent **claim 12**, the recited method appears to contain abstract ideas such as calculating current values. Therefore, in order to be statutory, the claim must be directed to a practical application producing a concrete, useful and tangible result. The claim does not appear to produce a tangible result needed to support a practical application. The act of "outputting the receiving characteristic" does not appear to necessarily produce a tangible result. The act of "outputting the receiving characteristic" could be interpreted as simply producing a result of a calculation. When a claim can be broadly interpreted to include both statutory and non-statutory material, the claim must be rejected.

7.11. Regarding independent **claims 8, 11 and 12**, the recited simulation apparatus and method appear to contain abstract ideas such as calculating current values. Therefore, in order to be statutory, the claims must be directed to a practical application producing a concrete, useful and tangible result. The claims do not appear to produce a tangible result needed to support a practical application when the distance between the object and the source is less than a threshold difference. The claims must always produce a tangible result.

7.12. Regarding **claim 7**, the claim is directed to a computer-readable storage medium on which is recorded a program process. The recorded program process allows the interpretation of source code, which is non-statutory as non-functional descriptive material. The Examiner suggests amending the claim in the spirit of "A computer-readable storage medium on which is recorded executable instructions of a program process . . .".

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. **Claims 1 – 2, 4 - 5 and 7 - 10** are rejected under 35 U.S.C. 103(a) as being obvious over Nishino et al (U.S. Patent 5,650,935) in view of Otsu et al (U.S. Patent 5,903,477), further in view of Cheng ("Field and Wave Electromagnetics", 1989, David K. Cheng).

9.1. The art of Nishino is directed to calculation of the intensity of an electromagnetic field generated by an electronic device (**Abstract**).

9.2. The art of Otsu is directed to calculating the intensity of an electromagnetic field generated by an electronic device (**column 1, lines 1 - 15**).

9.3. The art of Cheng is directed to calculating an electromagnetic field generated by a generating wave source (**pages 632 – 634, section 11-6.1**).

9.4. Regarding **claim 1**:

9.5. Nishino appears to teach:

9.5.1. a first current calculation device calculating current values (**Figure 4, element 12**, and **column 7, lines 7 – 9**, and **Figure 5, element ST5**, and **column 10, lines 23 – 25**) of the generation source (**column 7, lines 16 – 20**).

9.5.1.1. Regarding **column 7, lines 16 – 20**, since the current in the applicable sections induces a wave source, the applicable sections are a radio wave generation source.

9.5.2. a current storage device storing the current values of the generation source (**Figure 5, element ST7**(refer to following subsection)).

9.5.2.1. Regarding **Figure 5, element ST7**, since the process flow in Figure 5 displays that the calculated current values in element ST5 are used in the calculations of element ST7, it would have been obvious that a current storage device is included that stores the current values of the generation source.

9.5.3. a calculation of currents in an object that receives a radio wave (**Figure 19, element Housing** (refer to following subsection)) by: a second current calculation device calculating current values of the object (**Figure 4, element 13**, and **column**

7, lines 10 – 12, and **Figure 5, element ST7**, and **column 11, lines 19- 21**) using simultaneous equations of the object when the object is divided into a plurality of elements (**Figure 5, element ST7**, and **column 11, lines 19- 21**, and **Figure 5, element ST6**, and **column 10, lines 46 – 51**), the simultaneous equations of the object having currents that flow through respective elements as unknowns and the current values stored in the current storage device as constants (**Figure 5, element ST7**, and **column 10, lines 56 – 64**).

9.5.3.1. Regarding **Figure 19, element Housing**, in Figure 19, element Housing is an object that receives a radio wave.

9.5.4. an output device calculating the receiving characteristic of the object based on the current values of the object (**Figure 5, elements ST8, ST9, and 21**(refer to following subsection), and **column 11, lines 32 – 36)** and outputting the receiving characteristic of the object (**Figure 5, elements ST8, ST9, and 21**(refer to following subsection), and **column 11, lines 22 – 36**).

9.5.4.1. Regarding **Figure 5, elements ST8, ST9, and 21**, since the electric/magnetic field is a property of the currents in the receiving object, it is a receiving characteristic.

9.5.4.2. Regarding **Figure 5, elements ST8, ST9, and 21**, since the electric/magnetic field is being calculated at multiple observation points, it would have been obvious that the electric/magnetic field being calculated at multiple positional relationships from the generation source.

9.6. Nishino does not specifically teach:

9.6.1. <u>a simulation apparatus</u>.

9.6.2. a first current calculation device calculating current values of the generation source *using simultaneous equations of the generation source when the generation source is divided into a plurality of elements, the simultaneous equations of the generation source having currents that flow through respective elements as unknowns*.

9.6.3. a second current calculation device calculating current values of the object using simultaneous equations of the object when the object is divided into a plurality of elements *and a positional relationship between the generation source and object changes*, the simultaneous equations of the object having currents that flow through respective elements as unknowns and the current values stored in the current storage device as constants.

9.6.4. *simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave generation source and the current values of the receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance*.

9.7. Otsu appears to teach:

9.7.1. a simulation apparatus (**column 23, line 31**).

9.7.2. a current calculation device calculating current values of the generation source using simultaneous equations of the generation source when the generation

source is divided into a plurality of elements (**column 5, lines 54 – 58**(refer to following subsection), and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**), the simultaneous equations of the generation source having currents that flow through respective elements as unknowns (**column 5, lines 54 – 58**, and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**).

9.7.2.1. Regarding **column 5, lines 54 – 58**, it was well known that in the moment method, a generation source is divided into a plurality of elements.

9.8. Cheng appears to teach:

9.8.1. calculating current values of the object using simultaneous equations of the object *and a positional relationship between the generation source and object changes* **(page 632, figure 11-16; and page 632, section 11-6.1, first paragraph and the figure suggests moving an antenna to a new position**).

9.8.2. simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave generation source and the current values of the receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance (**pages 632 – 632, section 11-6.1;** *Cheng teaches that under normal circumstances, transmitting and receiving antennas are separated by very*

large distances, and the coupling impedances are negligibly small as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna is concerned (**section 11-6.1, page 633**), *which means that currents in the transmitting antenna can be calculated separately without regard for the currents in the receiving antenna and the current values in the transmitting antenna are regarded as constants* (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104**), *and current values of the receiving characteristic of the object can be calculated separately* (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104; since the transmitting and receiving antennas are separated by a large distance, it would have been obvious that there was a threshold distance. Cheng also teaches near and far field approximations of the electromagnetic radiation field on pages 604 – 605;** *Cheng recites that the transmitting and receiving antennas need to be separated by very large distances in order for the coupling impedance to be neglected as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna* (**Cheng, page 633, first paragraph**). *The ordinary artisan would have known about the far field approximation of the equations of electromagnetic radiation* (***Cheng, page 605***), *as opposed to the near field equations* (**Cheng, pages 604 – 605**). *The near field equations contain $1/R^3$, which can be ignored when R is large* (also **see Kraus, "Electromagnetics", 1984, page 626, second paragraph that starts with, "When r is very large . . ."; and Ramo, "Fields and Waves in Communication Electronics", 1965, page 644**), *which would have been known by the ordinary artisan. Therefore, the ordinary artisan would have used a distance threshold to determine if it was appropriate to use a far field approximation.*).

9.9. The art of Otsu, Cheng and Nishino are analogous art because they are directed to a similar problem solving area: that of calculating an electromagnetic field generated by a generating wave source.

9.10. The motivation for combining the art of Otsu with the art of Nishino would have been the common suggestion in both Otsu and Nishino of the ability to calculate at a high speed the electromagnetic fields radiated from an electronic device (**Otsu, column 1, lines 8 – 15**, and **Nishino, column 1, lines 8 – 11**), which would have been recognized by the ordinary artisan as a computational benefit to save time.

9.11. The motivation to combine the art of Cheng with the art of Nishino would have been the calculation benefit shown in Cheng that the currents in the transmitting and receiving antennas can be calculated separately because the back reaction of the receiving antenna on the transmitting antenna can be set to zero (**page 634, figure 11-18**), which would have been recognized by the ordinary artisan as providing a computational time saving benefit.

9.12. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Otsu and the art of Cheng with the art of Nishino to produce the claimed invention.

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9.13. Regarding **claim 2**:

9.14. Nishino appears to teach:

9.14.1. the second current calculating device includes a device calculating mutual impedance between elements of the object (**Figure 4, elements 13 and 130**, and

column 6, lines 53 – 55), a device calculating mutual impedance between an element of the generation source and an element of the object (**Figure 4, elements 13 and 130**, and **column 6, lines 53 – 57**) and a matrix storage device storing matrix data of mutual impedance between elements of the object (**Figure 5, elements ST6 and ST7**(refer to following subsection)), generates simultaneous equations of the object using the matrix data stored in the matrix storage device as a coefficient matrix (**Figure 5, elements ST6 and ST7** and **column 10, lines 56 – 64**) and calculates new current values (**Figure 5, element ST7** and **column 10, lines 56 – 64**).

9.14.1.1. Regarding **Figure 5, elements ST6 and ST7**, since the process flow in Figure 5 displays that the calculated matrix data of mutual impedance between elements of the object in element ST6 are used in the calculations of element ST7, it would have been obvious that a matrix storage device is included that stores the matrix data of mutual impedance between elements of the object (Figure 5, element ST7).

9.15. Nishino does not specifically teach:

9.15.1. the second current calculating device includes a device calculating mutual impedance between elements of the object, a device calculating mutual impedance between an element of the generation source and an element of the object and a matrix storage device storing matrix data of mutual impedance between elements of the object, *calculates mutual impedance between an element of the generation source and an element of the object corresponding to a new position when a position of the generation source changes,* generates simultaneous equations of the object

corresponding to the new position using the matrix data stored in the matrix storage device as a coefficient matrix and calculates new current values.

9.16. Otsu appears to teach:

9.16.1. a current calculation device calculating current values of the generation source using simultaneous equations of the generation source when the generation source is divided into a plurality of elements (**column 5, lines 54 – 58, and Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**), the simultaneous equations of the generation source having currents that flow through respective elements as unknowns (**column 5, lines 54 – 58, and Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**). (**It was well known that in the moment method, a generation source is divided into a plurality of elements**).

9.17. Cheng appears to teach:

9.17.1. calculates mutual impedance between an element of the generation source and an element of the object corresponding to a new position when a position of the generation source changes, generates simultaneous equations of the object corresponding to the new position (**page 632, figue 11-16, and section 11-6.1, first paragraph**).

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9.18. Regarding **claim 4**:

9.19. Nishino appears to teach:

9.20. a judging device judging whether a calculation method in which the current values of the generation source are regarded as constants can be used, wherein said second current calculation device calculates the current values of the object using the simultaneous equations of the object if the calculation method can be used (**Column 7, lines 15 – 27, and Figure 5, element ST3**, **and column 9, lines 20 – 23**).

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9.21. Regarding **claim 5**:

9.22. Nishino appears to teach:

9.23. a first current calculation device calculating current values (**Figure 4, element 12**, and **column 7, lines 7 – 9**, and **Figure 5, element ST5**, and **column 10, lines 23 – 25**) of a transmitting antenna (**column 7, lines 16 – 20**).

9.23.1. Regarding **column 7, lines 16 – 20**, since the current in the applicable sections induces a wave source, the applicable sections are a transmitting antenna.

9.24. a current storage device storing the current values of the transmitting antenna (**Figure 5, element ST7** (refer to following subsection)).

9.24.1. Regarding **Figure 5, element ST7**, since the process flow in Figure 5 displays that the calculated current values in element ST5 are used in the calculations of element ST7, it would have been obvious that a current storage device is included that stores the current values of the transmitting antenna.

9.25. a matrix storage device storing matrix data of mutual impedance between elements of the object when the object is divided into a plurality of elements (**Figure 5, elements ST6 and ST7**(refer to following subsection), and **column 10, lines 46 - 49**).

9.25.1. Regarding **Figure 5, elements ST6 and ST7**, since the process flow in Figure 5 displays that the calculated matrix data of mutual impedance between elements of the object in element ST6 are used in the calculations of element ST7, it would have been obvious that a matrix storage device is included that stores the matrix data of mutual impedance between elements of the object.

9.26. a device calculating mutual impedance between an element of the transmitting antenna and an element of the object (**Figure 4, elements 13 and 130**, and **column 6, lines 53 - 57**).

9.27. a calculation of currents in an object that receives a radio wave (**Figure 19, element Housing**(refer to following subsection)) by a second current calculation device (**Figure 4, element 13**, and **column 6, line 52**) generating simultaneous equations of the object using currents that flow through respective elements of the object as unknowns (**Figure 4, element ST**, and **column 10, lines 56 - 64**), matrix data stored in the matrix storage device as a coefficient matrix (**Figure 4, element ST**, and **column 10, lines 56 - 64**) and both the current values stored in the current storage device and the mutual impedance between the element of the transmitting antenna and the element of the object as constants (**Figure 4, element ST**, and **column 10, lines 56 - 64**), and calculating current values of the object (**Figure 4, element ST**, and **column 10, lines 56 - 64**).

9.28. a device calculating the directivity characteristic of the object based on the current values of the object (**Figure 5, element ST7**, and **column 10, lines 56 - 62**(refer to the following subsection)).

9.28.1. Regarding **Column 10, lines 56 - 62**, the calculated currents are the directivity characteristic of the object.

9.29. an output device calculating the receiving characteristic of the object based on the current values of the object (**Figure 5, elements ST8, ST9, and 21**(refer to following subsection), and **column 11, lines 32 – 36)**, the receiving characteristic being calculated at multiple positional relationships from the transmitting antenna, and outputting the receiving characteristic of the object (**Figure 5, elements ST8, ST9, and 21**(refer to following subsection), and **column 11, lines 22 – 36**).

9.29.1. Regarding **Figure 5, elements ST8, ST9, and 21**, since the electric/magnetic field is a property of the currents in the receiving object, it is a receiving characteristic.

9.29.2. Regarding **Figure 5, elements ST8, ST9, and 21**, since the electric/magnetic field is being calculated at multiple observation points, it would have been obvious that the electric/magnetic field is being calculated at multiple positional relationships from the transmitting antenna.

9.30. Nishino does not specifically teach:

9.31. *a simulation apparatus*.

9.32. a first current calculation device calculating current values of a transmitting antenna *using simultaneous equations of the transmitting antenna when the transmitting antenna is divided into a plurality of elements, the simultaneous equations of the*

transmitting antenna having currents that flow through respective elements as unknowns.

9.33. a device calculating mutual impedance between an element of the transmitting antenna and an element of the object _for each angle of the transmitting antenna against the object._

9.34. a calculation of currents in an object that receives a radio wave by a second current calculation device generating simultaneous equations of the object _for each angle of the transmitting antenna_ using currents that flow through respective elements of the object as unknowns, matrix data stored in the matrix storage device as a coefficient matrix and both the current values stored in the current storage device and the mutual impedance between the element of the transmitting antenna and the element of the object as constants, and calculating current values of the object.

9.35. an output device calculating the _directivity_ characteristic of the object based on the current values of the object and outputting the _directivity_ characteristic of the object.

9.36. _simultaneous equations of the radio wave transmitted from the transmitting antenna and the simultaneous equations of the directivity characteristic of the object are separated by regarding the current values of the radio wave transmitted from the transmitting antenna as constants when a distance between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave transmitted from the transmitting antenna and the current values of the directivity characteristic of the object are separately calculated when the distance between the object and the source is greater than or equal to a threshold distance._

9.37. Otsu appears to teach:

9.38. a simulation apparatus (**column 23, line 31**).

9.39. a current calculation device calculating current values of the transmitting antenna using simultaneous equations of the generation source when the transmitting antenna is divided into a plurality of elements (**column 5, lines 54 – 60**, and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**), the simultaneous equations of the transmitting antenna having currents that flow through respective elements as unknowns (**column 5, lines 54 – 58**, and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**; It would have been obvious that in the moment method, a generation source is divided into a plurality of elements).

9.39.1. Regarding **column 5, lines 54 – 60**, and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current",** since the calculated currents are used to calculate an intensity of radiation of an electromagnetic field, it would have been obvious that the device is a transmitting antenna.

9.40. Cheng appears to teach:

9.41. a calculation of currents in an object that receives a radio wave <u>*for each angle of the transmitting antenna against the object*</u> (**page 632, figure 11-16, and section 11-6.1, first paragraph**).

9.42. calculating the *directivity* characteristic of the object based on the current values of the object (**page 632, figure 11-16, and section 11-6.1, first paragraph**).

9.43. simultaneous equations of the radio wave transmitted from the transmitting antenna and the simultaneous equations of the directivity characteristic of the object are separated by regarding the current values of the radio wave transmitted from the transmitting antenna as constants when a distance between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave transmitted from the transmitting antenna and the current values of the directivity characteristic of the object are separately calculated when the distance between the object and the source is greater than or equal to a threshold distance (**pages 632 – 634, section 11-6.1**).

9.43.1. Regarding (**pages 632 – 634, section 11-6.1**): Cheng teaches that under normal circumstances, transmitting and receiving antennas are separated by very large distances, and the coupling impedances are negligibly small as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna is concerned (**section 11-6.1, page 633**), which means that currents in the transmitting antenna can be calculated separately without regard for the currents in the receiving antenna and the current values in the transmitting antenna are regarded as constants (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104**), and current values of the directivity characteristic of an object can be calculated separately (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104; since the transmitting and receiving antennas are separated by a large distance, it would have been obvious that there was a**

threshold distance. Cheng also teaches near and far field approximations of the electromagnetic radiation field on pages 604 – 605; *Cheng recites that the transmitting and receiving antennas need to be separated by very large distances in order for the coupling impedance to be neglected as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna* (**Cheng, page 633, first paragraph**). *The ordinary artisan would have known about the far field approximation of the equations of electromagnetic radiation (**Cheng, page 605**), as opposed to the near field equations* (**Cheng, pages 604 – 605**). *The near field equations contain $1/R^3$, which can be ignored when R is large* (also **see Kraus, "Electromagnetics", 1984, page 626, second paragraph that starts with, "When r is very large . . ."; and Ramo, "Fields and Waves in Communication Electronics", 1965, page 644**), *which would have been known by the ordinary artisan. Therefore, the ordinary artisan would have used a distance threshold to determine if it was appropriate to use a far field approximation.*).

9.44. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Otsu and the art of Cheng with the art of Nishino to obtain the invention as specified in claim 5.

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9.45. Regarding **claim 7**:

9.46. Nishino appears to teach:

9.47. a computer-readable storage medium storing a program process (**column 30, line11**).

9.47.1. Regarding **column 30, line11**, it would have been obvious that the medium is computer-readable.

9.48. calculating current values (**Figure 4, element 12**, and **column 7, lines 7 - 9**, and **Figure 5, element ST5**, and **column 10, lines 23 - 25**) of a generation source (**column 7, lines 16 - 20**).

9.48.1. Regarding **column 7, lines 16 - 20**, since the current in the applicable sections induces a wave source, the applicable sections are a radio wave generation source.

9.49. storing the current values of the generation source (**Figure 5, element ST7**(refer to following subsection)).

9.49.1. Regarding **Figure 5, element ST7**, since the process flow in Figure 5 displays that the calculated current values in element ST5 are used in the calculations of element ST7, it would have been obvious that current values of the generation source are stored.

9.50. calculating currents of an object (**Figure 19, element Housing**(refer to following subsection)) using simultaneous equations of the object when the object is divided into a plurality of elements (**Figure 5, element ST7**, and **column 11, lines 19- 21**, and **Figure 5, element ST6**, and **column 10, lines 46 - 51**), the simultaneous equations of the object having currents that flow through respective elements as unknowns and the stored current values as constants (**Figure 5, element ST7**, and **column 10, lines 56 - 64**).

9.50.1. Regarding **Figure 19, element Housing**, in Figure 19, element Housing is an object that receives a radio wave.

9.51. calculating the receiving characteristic of the object based on the current values of the object (**Figure 5, elements ST9**(refer to following subsection), and **column 11, lines 32 – 35**).

9.51.1. Regarding **Figure 5, elements ST9**, since the electric/magnetic field is a property of the currents in the receiving object, it is a receiving characteristic.

9.52. outputting the receiving characteristic of the object (**Figure 5, elements ST9, and 21**, and **column 11, lines 35 – 36**).

9.53. Nishino does not specifically teach:

9.54. calculating current values of a radio wave generation source *using simultaneous equations of the generation source when the generation source is divided into a plurality of elements, the simultaneous equations of the generation source having currents that flow through respective elements as unknowns*.

9.55. calculating current values of the object using simultaneous equations of the object when the object is divided into a plurality of elements *and a positional relationship between the generation source and object changes*, the simultaneous equations of the object having currents that flow through respective elements as unknowns and the stored current values as constants.

9.56. *simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance between the object and the source is greater than or equal to a threshold distance, and*

the current values of the radio wave generation source and the current values of the receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance.

9.57. Otsu appears to teach:

9.58. calculating current values of a radio wave generation source using simultaneous equations of the generation source when the generation source is divided into a plurality of elements (**column 5, lines 54 – 58**(refer to following subsection), and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**), the simultaneous equations of the generation source having currents that flow through respective elements as unknowns (**column 5, lines 54 – 58**, and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**).

9.58.1. Regarding **column 5, lines 54 – 58**, it was well known that in the moment method, a generation source is divided into a plurality of elements.

9.59. Cheng appears to teach:

9.60. calculating current values of the object using simultaneous equations of the object *and a positional relationship between the generation source and object changes* (**page 632, figure 11-16; and page 632, section 11-6.1, first paragraph and the figure suggests moving an antenna to a new position**).

9.61. simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance between the object and the source is greater than or equal to a threshold distance,

and the current values of the radio wave generation source and the current values of the receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance (**pages 632 – 632, section 11-6.1;** *Cheng teaches that under normal circumstances, transmitting and receiving antennas are separated by very large distances, and the coupling impedances are negligibly small as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna is concerned* (**section 11-6.1, page 633**), *which means that currents in the transmitting antenna can be calculated separately without regard for the currents in the receiving antenna and the current values in the transmitting antenna are regarded as constants* (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104**), *and current values of the receiving characteristic of the object can be calculated separately* (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104; since the transmitting and receiving antennas are separated by a large distance, it would have been obvious that there was a threshold distance. Cheng also teaches near and far field approximations of the electromagnetic radiation field on pages 604 – 605;** *Cheng recites that the transmitting and receiving antennas need to be separated by very large distances in order for the coupling impedance to be neglected as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna* (**Cheng, page 633, first paragraph**). *The ordinary artisan would have known about the far field approximation of the equations of electromagnetic radiation* ***(Cheng, page 605)****, as opposed to the near field equations* (**Cheng, pages 604 – 605**). *The near field equations contain $1/R^3$, which can be ignored when R is large* (also **see Kraus, "Electromagnetics", 1984, page 626, second paragraph that starts with, "When r is very large . . ."; and Ramo, "Fields and Waves in Communication Electronics",**

1965, page 644), *which would have been known by the ordinary artisan. Therefore, the ordinary artisan would have used a distance threshold to determine if it was appropriate to use a far field approximation.*).

9.62. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Otsu and the art of Cheng with the art of Nishino to obtain the invention as specified in claim 7.

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9.63. Regarding **claim 8**:

9.64. Nishino appears to teach:

9.65. calculating current values (**Figure 4, element 12**, and **column 7, lines 7 - 9**, and **Figure 5, element ST5**, and **column 10, lines 23 - 25**) of a generation source (**column 7, lines 16 - 20**).

9.65.1. Regarding **column 7, lines 16 - 20**, since the current in the applicable sections induces a wave source, the applicable sections are a radio wave generation source.

9.66. storing the current values of the generation source (**Figure 5, element ST7**(refer to following subsection)).

9.66.1. Regarding **Figure 5, element ST7**, since the process flow in Figure 5 displays that the calculated current values in element ST5 are used in the calculations of element ST7, it would have been obvious that current values of the generation source are stored.

9.67. calculating currents in an object that receives a radio wave (**Figure 19, element Housing**(refer to following subsection)) using simultaneous equations of the object when the object is divided into a plurality of elements (**Figure 5, element ST7**, and **column 11, lines 19- 21**, and **Figure 5, element ST6**, and **column 10, lines 46 – 51**), the simultaneous equations of the object having currents that flow through respective elements as unknowns and the stored current values as constants (**Figure 5, element ST7**, and **column 10, lines 56 – 64**).

9.67.1. Regarding **Figure 19, element Housing**, in Figure 19, element Housing is an object that receives a radio wave.

9.68. calculating the receiving characteristic of the object based on the current values of the object (**Figure 5, elements ST9** (refer to following subsection), and **column 11, lines 32 – 35**).

9.68.1. Regarding **Figure 5, elements ST9**, since the electric/magnetic field is a property of the currents in the receiving object, it is a receiving characteristic.

9.69. outputting the receiving characteristic of the object (**Figure 5, elements ST9, and 21**, and **column 11, lines 35 – 36**).

9.70. the second current calculating device includes a device: calculating mutual impedance between elements of the object (**Figure 4, elements 13 and 130**, and **column 6, lines 53 – 55**), calculating mutual impedance between an element of the generation source and an element of the object with matrix data of mutual impedance between elements of the object (**Figure 4, elements 13 and 130**, and **column 6, lines 53 – 57**) and a matrix storage device storing matrix data of mutual impedance between elements of the object (**Figure 5, elements ST6 and ST7**), generating

simultaneous equations of the object using the matrix data stored in the matrix storage device as a coefficient matrix (**Figure 5, elements ST6 and ST7** and **column 10, lines 56 – 64**).

9.71. Nishino does not specifically teach:

9.72. *determining whether a distance between the object and the source is greater than or equal to a threshold distance*.

9.73. calculating current values of a radio wave generation source *using simultaneous equations of the generation source when the generation source is divided into a plurality of elements, the simultaneous equations of the generation source having currents that flow through respective elements as unknowns when the distance between the object and the source is greater than or equal to a threshold distance*.

9.74. storing the current values of the generation source *when the distance between the object and the source is greater than or equal to a threshold distance.*

9.75. calculating current values of the object using simultaneous equations of the object when the object is divided into a plurality of elements *and a positional relationship between the generation source and object changes*, the simultaneous equations of the object having currents that flow through respective elements as unknowns and the stored current values as constants *when the distance between the object and the source is greater than or equal to a threshold distance*.

9.76. calculating the receiving characteristic of the object based on the current value of the object *when the distance between the object and the source is greater than or equal to a threshold distance*.

9.77. outputting the receiving characteristic of the object where *the simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave generation source and the current values of the receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance*.

9.78. calculating mutual impedance between elements of the object, calculating mutual impedance between an element of the generation source and an element of the object with matrix data of mutual impedance between elements of the object *when the distance between the object and the source is greater than or equal to a threshold distance.*

9.79. calculating mutual impedance between an element of the generation source and an element of the object *corresponding to a new position when a position of the generation source changes and when the distance between the object and the source is greater than or equal to a threshold distance*.

9.80. generating simultaneous equations of the object *corresponding to the new position* using the matrix data stored in the matrix storage device as a coefficient matrix and

<u>calculating new voltage values using stored current values and the simultaneous equations when the distance between the object and the source is greater than or equal to a threshold distance</u>.

9.81. Otsu appears to teach:

9.82. calculating current values of a radio wave generation source using simultaneous equations of the generation source when the generation source is divided into a plurality of elements (**column 5, lines 54 – 58** (refer to following subsection), and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**), the simultaneous equations of the generation source having currents that flow through respective elements as unknowns (**column 5, lines 54 – 58**, and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**).

9.82.1. Regarding **column 5, lines 54 – 58**, it was well known that in the moment method, a generation source is divided into a plurality of elements.

9.83. Cheng appears to teach:

9.84. determining whether a distance between the object and the source is greater than or equal to a threshold distance (**page 633, first paragraph; since the approximation of $Z_{12} = 0$ is valid when the distance between the antennas is large, it would have been obvious to determine whether the separating distance is above a threshold distance**).

9.85. calculating current values of the object using simultaneous equations of the object <u>*and a positional relationship between the generation source and object changes*</u> (**page 632, figure 11-16; and page 632, section 11-6.1, first paragraph and the figure suggests moving an antenna to a new position**).

9.86. simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave generation source and the current values of the receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance (**pages 632 – 632, section 11-6.1;** *Cheng teaches that under normal circumstances, transmitting and receiving antennas are separated by very large distances, and the coupling impedances are negligibly small as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna is concerned* (**section 11-6.1, page 633**), *which means that currents in the transmitting antenna can be calculated separately without regard for the currents in the receiving antenna and the current values in the transmitting antenna are regarded as constants* (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104**), *and current values of the receiving characteristic of the object can be calculated separately* (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104; since the transmitting and receiving antennas are separated by a large distance, it would have been obvious that there was a threshold distance. Cheng also teaches near and far field approximations of the electromagnetic radiation field on pages 604 – 605;** *Cheng recites that the*

transmitting and receiving antennas need to be separated by very large distances in order for the coupling impedance to be neglected as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna (**Cheng, page 633, first paragraph**). *The ordinary artisan would have known about the far field approximation of the equations of electromagnetic radiation* (***Cheng, page 605***)*, as opposed to the near field equations* (**Cheng, pages 604 – 605**). *The near field equations contain $1/R^3$, which can be ignored when R is large* (also **see Kraus, "Electromagnetics", 1984, page 626, second paragraph that starts with, "When r is very large . . ."; and Ramo, "Fields and Waves in Communication Electronics", 1965, page 644**), *which would have been known by the ordinary artisan. Therefore, the ordinary artisan would have used a distance threshold to determine if it was appropriate to use a far field approximation.*).

9.87. generating simultaneous equations of the object <u>*corresponding to the new position*</u> (**page 632, figure 11-16; and page 632, section 11-6.1, first paragraph and the figure suggests moving an antenna to a new position**).

9.88. calculating new voltage values using stored current values and the simultaneous equations when the distance between the object and the source is greater than or equal to a threshold distance (**pages 632 – 634, figure 11-16 and section 11-6.1, especially page 632, section 11-6.1, first paragraph and figure 11-16, and page 633, first paragraph**).

9.89. calculating mutual impedance between an element of the generation source and an element of the object <u>*corresponding to a new position when a position of the generation source changes*</u> (<u>***page 632, figure 11-16; and page 634, equation 11-104***</u>).

9.90. It would have been obvious that all the limitations of the claim would have only been performed when a distance between the object and the source is greater than or equal to a threshold distance, because as discussed above, the far field approximation of the electromagnetic radiation equations would have only been valid when a distance between the object and the source is greater than or equal to a threshold distance.

9.91. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Otsu and the art of Cheng with the art of Nishino to obtain the invention as specified in claim 8.

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9.92. Regarding **claim 9**:

9.93. Nishino appears to teach:

9.94. preserving the current values of a radio wave generation source (**Figure 5, elements ST5 and ST7** (refer to following subsection), and **column 6, lines 57 – 63**).

9.94.1. Regarding **Figure 5, elements ST5 and ST7**, since the process flow in Figure 5 displays that the calculated current values in element ST5 are used in the calculations of element ST7, it would have been obvious that the current values of the generation source are preserved.

9.94.2. Regarding **column 6, lines 57 – 63**, since the wave source induces a current in the inapplicable section, the wave source is a radio wave generation source.

9.95. generating simultaneous equations of an object that receives a radio wave (**Figure 19, lines 39 – 60**) according to a position of the object when the object is divided into a

plurality of elements (**Figure 5, elements ST6 and ST7**, and **column 10, lines 46 – 64**), the simultaneous equations of the object having currents that flow through respective elements as unknowns and the preserved current values as constants (**Figure 5, element ST7**);

9.95.1. Regarding **Figure 19, lines 39 – 60**, since the current through the patch is based on a wave source transmitting radio waves, the patch is an object that receives radio waves.

9.95.2. Regarding **Figure 5, elements ST6 and ST7**, and **column 10, lines 46 – 64**, it was well known that in the moment method, an object is divided into a plurality of elements.

9.95.3. Regarding **Figure 5, elements ST6 and ST7**, and **column 10, lines 46 – 64**, the mutual impedance between the "m" sections for the moment method and "n" sections for the distributed constant circuit is calculated according to the position of the object.

9.96. calculating current values of the object corresponding to the position of the object using the simultaneous equations of the object (**Figure 5, element ST7**, and **column 10, lines 56 – 64**).

9.96.1. Since the current values of the object are calculated using the simultaneous equations generated by position (refer to the preceding section), the current values are calculated corresponding to the position of the object.

9.97. calculating the receiving characteristic of the object based on the current values of the object (**Figure 5, elements ST7**, and **column 11, lines 19 – 21**).

9.97.1. Regarding **Figure 5, elements ST7**, and **column 11, lines 19 – 21**, since the current is a property of the receiving object, it is a receiving characteristic.

9.98. outputting the receiving characteristic of the object on an output device (**Figure 5, elements ST8, ST9, and 21**, and **column 11, lines 22 - 36**).

9.99. Nishino does not specifically teach:

9.100. *a simulation method*.

9.101. *generating simultaneous equations of the generation source when the generation source is divided into a plurality of elements, the simultaneous equations of the generation source having currents that flow through respective elements as unknowns*.

9.102. *calculating current values of the generation source using the simultaneous equations of the object*.

9.103. *simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave generation source and the current values of the receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance*.

9.104. Otsu appears to teach:

9.105. a simulation method (**column 28, line 32**).

9.106. a current calculation device calculating current values of the generation source using simultaneous equations of the generation source when the generation source is divided into a plurality of elements (**column 5, lines 54 – 58**(refer to following subsection), and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**), the simultaneous equations of the generation source having currents that flow through respective elements as unknowns (**column 5, lines 54 – 58**, and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**).

9.106.1. Regarding **column 5, lines 54 – 58**, it was well known that in the moment method, a generation source is divided into a plurality of elements.

9.107. Cheng appears to teach:

9.108. simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave generation source and the current values of the receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance (**pages 632 – 632, section 11-6.1;** *Cheng teaches that under normal circumstances, transmitting and receiving antennas are separated by very large distances, and the coupling impedances are negligibly small as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna is concerned* (**section 11-6.1, page 633**), *which means that currents in the transmitting antenna can be calculated separately without regard for the currents in the receiving antenna and the current*

values in the transmitting antenna are regarded as constants (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104**), *and current values of the receiving characteristic of the object can be calculated separately* (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104; since the transmitting and receiving antennas are separated by a large distance, it would have been obvious that there was a threshold distance. Cheng also teaches near and far field approximations of the electromagnetic radiation field on pages 604 – 605;** *Cheng recites that the transmitting and receiving antennas need to be separated by very large distances in order for the coupling impedance to be neglected as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna* (**Cheng, page 633, first paragraph**). *The ordinary artisan would have known about the far field approximation of the equations of electromagnetic radiation* ***(Cheng, page 605)****, as opposed to the near field equations* (**Cheng, pages 604 – 605**). *The near field equations contain $1/R^3$, which can be ignored when R is large* (also **see Kraus, "Electromagnetics", 1984, page 626, second paragraph that starts with, "When r is very large . . ."; and Ramo, "Fields and Waves in Communication Electronics", 1965, page 644**), *which would have been known by the ordinary artisan. Therefore, the ordinary artisan would have used a distance threshold to determine if it was appropriate to use a far field approximation.*).

9.109. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Otsu and Cheng with the art of Nishino to obtain the invention as specified in claim 9.

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9.110. Regarding **claim 10**:

9.111. Nishino appears to teach:

9.112. first current calculation means for calculating current values (**Figure 4, element 12**, and **column 7, lines 7 – 9**, and **Figure 5, element ST5**, and **column 10, lines 23 – 25**) of a generation source (**column 7, lines 16 – 20**).

9.112.1. Regarding **column 7, lines 16 – 20**, since the current in the applicable sections induces a wave source, the applicable sections are a radio wave generation source.

9.113. current storage means for storing the current values of the generation source (**Figure 5, element ST7** (refer to following subsection)).

9.113.1. Regarding **Figure 5, element ST7**, since the process flow in Figure 5 displays that the calculated current values in element ST5 are used in the calculations of element ST7, it would have been obvious that a current storage device is included that stores the current values of the generation source.

9.114. second current calculation means for calculating current values of the object (**Figure 4, element 13**, and **column 7, lines 10 – 12**, and **Figure 5, element ST7**, and **column 11, lines 19- 21**) using simultaneous equations of the object when the object is divided into a plurality of elements (**Figure 5, element ST7**, and **column 11, lines 19- 21**, and **Figure 5, element ST6**, and **column 10, lines 46 – 51**), the simultaneous equations of the object having currents that flow through respective elements as unknowns and the current values stored in the current storage device as constants (**Figure 5, element ST7**, and **column 10, lines 56 – 64**).

9.114.1. Regarding **Figure 19, element Housing**, in Figure 19, element Housing is an object that receives a radio wave.

9.115. output means for calculating the receiving characteristic of the object based on the current values of the object (**Figure 5, elements ST8, ST9, and 21**(refer to following subsection), and **column 11, lines 32 – 36)**, the receiving characteristic being calculated at multiple positional relationships from the generation source, and outputting the receiving characteristic of the object (**Figure 5, elements ST8, ST9, and 21**(refer to following subsection), and **column 11, lines 22 – 36**).

9.115.1. Regarding **Figure 5, elements ST8, ST9, and 21**, since the electric/magnetic field is a property of the currents in the receiving object, it is a receiving characteristic.

9.115.2. Regarding **Figure 5, elements ST8, ST9, and 21**, since the electric/magnetic field is being calculated at multiple observation points, it would have been obvious that the electric/magnetic field is being calculated at multiple positional relationships from the generation source.

9.116. Nishino does not specifically teach:

9.117. *a simulation apparatus*.

9.118. first current calculation means for calculating current values of a radio wave generation source *using simultaneous equations of the generation source when the generation source is divided into a plurality of elements, the simultaneous equations of the generation source having currents that flow through respective elements as unknowns*.

9.119. second current calculation means for calculating current values of the object using simultaneous equations of the object when the object is divided into a plurality of

elements *<u>and a positional relationship between the generation source and object changes</u>*, the simultaneous equations of the object having currents that flow through respective elements as unknowns and the current values stored in the current storage device as constants.

9.120. *<u>simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave generation source and the current values of the receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance</u>*.

9.121. Otsu appears to teach:

9.122. a simulation apparatus (**column 23, line 31**).

9.123. first current calculation means for calculating current values of the generation source using simultaneous equations of the generation source when the generation source is divided into a plurality of elements (**column 5, lines 54 – 58**(refer to following subsection), and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**), the simultaneous equations of the generation source having currents that flow through respective elements as unknowns (**column 5, lines 54 – 58**, and **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**).

9.123.1. Regarding **column 5, lines 54 – 58**, it was well known that in the moment method, a generation source is divided into a plurality of elements.

9.124. means for calculating current values of the object using simultaneous equations of the object *and a positional relationship between the generation source and object changes* (**page 632, figure 11-16; and page 632, section 11-6.1, first paragraph and the figure suggests moving an antenna to a new position**).

9.125. simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave generation source and the current values of the receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance (**pages 632 – 632, section 11-6.1;** *Cheng teaches that under normal circumstances, transmitting and receiving antennas are separated by very large distances, and the coupling impedances are negligibly small as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna is concerned* (**section 11-6.1, page 633**), *which means that currents in the transmitting antenna can be calculated separately without regard for the currents in the receiving antenna and the current values in the transmitting antenna are regarded as constants* (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104**), *and current values of the receiving characteristic of the object can be calculated separately* (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104; since the transmitting and receiving antennas are separated by a large distance, it would have been obvious that there was a threshold distance. Cheng also teaches near and far field approximations of the electromagnetic radiation field on pages 604 – 605;** *Cheng recites that the*

transmitting and receiving antennas need to be separated by very large distances in order for the coupling impedance to be neglected as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna (**Cheng, page 633, first paragraph**). *The ordinary artisan would have known about the far field approximation of the equations of electromagnetic radiation* (**Cheng, page 605**), *as opposed to the near field equations* (**Cheng, pages 604 - 605**). *The near field equations contain $1/R^3$, which can be ignored when R is large* (also **see Kraus, "Electromagnetics", 1984, page 626, second paragraph that starts with, "When r is very large . . ."; and Ramo, "Fields and Waves in Communication Electronics", 1965, page 644**), *which would have been known by the ordinary artisan. Therefore, the ordinary artisan would have used a distance threshold to determine if it was appropriate to use a far field approximation.*).

9.126. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Otsu and the art of Cheng with the art of Nishino to obtain the invention as specified in claim 10.

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10. **Claim 3** is rejected under 35 U.S.C. 103(a) as being obvious over Nishino as modified by Otsu and Cheng as applied to claims **1 – 2, 4 - 5 and 7 - 10** above, further in view of Lay ("Linear Algebra and Its Applications", 1997, David C. Lay).

10.1. Nishino as modified by Otsu and Cheng teaches a simulation apparatus for simulating a receiving characteristic of any object that receives a radio wave transmitted from a radio wave generation source as recited in claims **1 – 2, 4 - 5 and 7 - 10** above.

10.2. Regarding **claim 3**:

10.3. Nishino does not specifically teach:

10.3.1. the second current calculation device further includes a factorization device factorizing the coefficient matrix by a prescribed factorization method and said matrix storage device stores matrix data of a factorized coefficient matrix.

10.4. Lay appears to teach:

10.4.1. factorizing a coefficient matrix by a prescribed factorization method (**pages 133 - 139, section 2.5 Matrix Factorizations**);

10.4.2. stores matrix data of a factorized coefficient matrix (**pages 133 - 139, section 2.5 Matrix Factorizations**);

10.5. Nishino as modified by Otsu and Cheng, and the art of Lay, are analogous art because they contain a similar problem solving area, that of calculating solutions to sequences simultaneous equations, all with the same coefficient matrix.

10.6. The motivation for combining the art of Nishino as modified by Otsu and Cheng and the art of Lay would have been the knowledge of an ordinary artisan that LU factorization is useful to solve sequences of simultaneous equations, all with the same coefficient matrix, by providing reduced calculation time, which would have provided the expectation of a computational benefit.

10.7. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Nishino as modified by Otsu and Cheng and the art of Lay to obtain the invention as specified in claim 3.

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11. **Claim 6** is rejected under 35 U.S.C. 103(a) as being obvious over Otsu et al (U.S. Patent 5,903,477) in view of Miller (Edmund K. Miller, "A Selective Survey of Computational Electromagnetics", IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION, VOL. 36, No. 9), further in view of Cheng ("Field and Wave Electromagnetics", 1989, David K. Cheng).

11.1. The art of Otsu is directed to calculating the intensity of an electromagnetic field generated by an electronic device.

11.2. The art of Miller is directed to calculating the intensity of an electromagnetic field generated by an electronic device.

11.3. The art of Cheng is directed to calculating an electromagnetic field generated by a generating wave source (**pages 632 – 634, section 11-6.1**).

11.4. Otsu and Cheng are analogous art because they are directed to a similar problem solving area, that of calculating an electromagnetic field generated by a generating wave source.

11.5. Otsu and Miller are analogous art because they are directed to a similar problem solving area, that of calculating an electromagnetic field generated by an electronic device.

11.6. Regarding **claim 6**:

11.7. Otsu appears to teach:

11.8. a simulation apparatus (**column 23, line 31**).

11.9. an impedance storage device storing data of mutual impedance between elements of a radio wave generation source when the generation source is divided into a plurality of elements (**Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**, and **column 5, lines 54 – 58**).

11.9.1. Regarding **column 5, lines 54 – 58**, it was well known that in the moment method, a generation source is divided into a plurality of elements.

11.9.2. Regarding **Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**, since the impedance calculated in the box labeled "calculation of mutual impedance" is used in the box labeled "simultaneous equation for calculation of current", it would have been obvious that an impedance storage device is used.

11.10. a current calculation device calculating current values using simultaneous equations having currents that flow through respective elements of the generation source as unknowns and having a matrix consisting of the data stored in the impedance storage device (**Figure 45, boxes labeled "calculation of mutual impedance" and "simultaneous equation for calculation of current"**, and **column 5, lines 54 – 58**).

11.11. an output device calculating the electric field and magnetic field of the generation source based on the current values and outputting the electric field and magnetic field (**Figure 45, box labeled "calculation of electric field and magnetic field", and symbol labeled "output data"**, and **column 5, lines 54 - 60**).

11.12. Otsu does not explicitly teach:

11.13. an impedance storage device storing _both_ data of mutual impedance between elements of the generation source when the generation source is divided into a plurality of elements _and data of mutual impedance between elements of an object that receives a radio wave when the object is divided into a plurality of elements as data independent from a position of the generation source_.

11.14. a device _calculating mutual impedance between an element of the generation source and an element of the object corresponding to a new position when the position the generation source changes_.

11.15. an output device _calculating the receiving characteristic of the object_ based on the current values _and outputting the receiving characteristic of the object_.

11.16. _the simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave generation source and the current values of the_

receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance.

11.17. Miller appears to teach:

11.18. an impedance storage device storing *both* data of mutual impedance between elements of the generation source when the generation source is divided into a plurality of elements *and data of mutual impedance between elements of an object that receives a radio wave when the object is divided into a plurality of elements as data independent from a position of the generation source*. (**Page 1299, section c; Miller teaches when an antenna may be evaluated in several positions, it is computationally advantageous to partition the impedance matrix into pieces representing the antenna, the other structure, and their mutual interaction pieces**).

11.19. Cheng appears to teach:

11.20. *calculating mutual impedance between an element of the generation source and an element of the object corresponding to a new position when the position the generation source changes* (**page 632, figure 11-16, and pages 632 – 634, section 11-6.1, especially page 32, section 11-6.1, first paragraph suggests moving an antenna to a new position**).

11.21. *calculating the receiving characteristic of the object* based on the current values *and outputting the receiving characteristic of the object* (**pages 632 – 634, section 11-6.1**).

11.22. simultaneous equations of the radio wave generation source and the simultaneous equations of the receiving characteristic of the object are separated by regarding the current values of the radio wave generation source as constants when a distance

between the object and the source is greater than or equal to a threshold distance, and the current values of the radio wave generation source and the current values of the receiving characteristic of the object are separately calculated when a distance between the object and the source is greater than or equal to a threshold distance (**pages 632 – 632, section 11-6.1;** *Cheng teaches that under normal circumstances, transmitting and receiving antennas are separated by very large distances, and the coupling impedances are negligibly small as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna is concerned* (**section 11-6.1, page 633**), *which means that currents in the transmitting antenna can be calculated separately without regard for the currents in the receiving antenna and the current values in the transmitting antenna are regarded as constants* (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104**), *and current values of the receiving characteristic of the object can be calculated separately* (**page 634, figure 11-18; and page 633, entire page; and page 634, first paragraph and equation 11-104; since the transmitting and receiving antennas are separated by a large distance, it would have been obvious that there was a threshold distance. Cheng also teaches near and far field approximations of the electromagnetic radiation field on pages 604 – 605;** *Cheng recites that the transmitting and receiving antennas need to be separated by very large distances in order for the coupling impedance to be neglected as far as the reaction on the transmitting antenna owing to scattering by the receiving antenna* (**Cheng, page 633, first paragraph**). *The ordinary artisan would have known about the far field approximation of the equations of electromagnetic radiation* ***(Cheng, page 605)****, as opposed to the near field equations* (**Cheng, pages 604 – 605**). *The near field equations contain $1/R^3$, which can be ignored when R is large* (also **see Kraus, "Electromagnetics", 1984, page 626, second paragraph that starts with, "When r**

is very large . . ."; and Ramo, "Fields and Waves in Communication Electronics", 1965, page 644), *which would have been known by the ordinary artisan. Therefore, the ordinary artisan would have used a distance threshold to determine if it was appropriate to use a far field approximation.*).

11.23. The motivation for using the art of Otsu with the art of Miller would have been the benefit recited in Miller of a computational advantage to partition the impedance matrix when an antenna must be evaluated in different positions (**Miller, page 1299, section c**).

11.24. The motivation to combine the art of Cheng with the art of Otsu would have been the calculation benefit shown in Cheng that the currents in the transmitting and receiving antennas can be calculated separately because the back reaction of the receiving antenna on the transmitting antenna can be set to zero (**page 634, figure 11-18**), which would have been recognized by the ordinary artisan as providing a computational time saving benefit.

11.25. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Miller and the art of Cheng with the art of Otsu to produce the invention in claim 6.

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12. **Claims 11 and 12** are rejected under 35 U.S.C. 103(a) as being obvious over Cheng ("Field and Wave Electromagnetics", 1989, David K. Cheng), in view of Nishino (U.S. Patent Number 5,650,935).

12.1. Regarding **claim 11**:

12.2. Cheng appears to teach:

12.3. determining whether a distance between the object and the source is greater than or equal to a threshold distance (**page 633, first paragraph; since the approximation of Z_{12} = 0 is valid when the distance between the antennas is large, it would have been obvious to determine whether the separating distance is above a threshold distance**).

12.4. calculating current values of a source when the distance between the object and the source is greater than or equal to a threshold distance ***(page 634, figure 11-18; and page 633, equation 11-100)***.

12.4.1. Regarding ***(page 634, figure 11-18; and page 633, equation 11-100)***; it would have been obvious to the ordinary artisan at the time of invention to calculate the current values of the source by dividing V_1 by Z_{11}.

12.5. storing the current values as constants when the distance between the object and the source is greater than or equal to a threshold distance ***(page 634, equation 11-104; and page 634, figure 11-18; and pages 633 - 634)***.

12.5.1. Regarding ***(page 634, equation 11-104; and page 634, figure 11-18; and pages 633 - 634)***; it would have been obvious to the ordinary artisan at the time of invention to store the current values as constants since the value of I_1 is merely substituted into equation 11-104, while the value of Z_L can be changed to calculate a new I_2.

12.6. calculating current values of the object using the constants when the distance between the object and the source is greater than or equal to a threshold distance ***(page 634, equation 11-104; and page 634, figure 11-18)***.

12.6.1. Regarding ***(page 634, equation 11-104; and page 634, figure 11-18)***; the value of I_1 in equation 11-104 is the constant determined in the previous step.

12.7. calculating the receiving characteristic of the object based on the current values of the object ***(page 634, equation 11-104; and page 634, figure 11-18; the current I_2 is an receiving characteristic)***.

12.8. Cheng does not specifically teach:

12.9. outputting the receiving characteristic of the object on an output device.

12.10. Nishino appears to teach:

12.11. outputting the receiving characteristic of the object on an output device (***figure 5, element ST9 outputting to element 21***).

12.12. The motivation to use the art of Nishino with the art of Cheng would have been the knowledge of the ordinary artisan to output values from a calculation in order to make use of the results of the calculation.

12.13. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Nishino with the art of Cheng for to obtain the invention as specified in claim 11.

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12.14. Regarding **claim 12**:

12.15. Cheng appears to teach:

12.16. determining whether a distance between the object and the source is greater than or equal to a threshold distance (**page 633, first paragraph; since the approximation of Z_{12} = 0 is valid when the distance between the antennas is large, it would have been obvious to determine whether the separating distance is above a threshold distance**).

12.17. calculating current values of a source when the distance between the object and the source is greater than or equal to a threshold distance ***(page 634, figure 11-18; and page 633, equation 11-100)***.

12.17.1. Regarding ***(page 634, figure 11-18; and page 633, equation 11-100)***; it would have been obvious to the ordinary artisan at the time of invention to calculate the current values of the source by dividing V_1 by Z_{11}.

12.18. storing the current values as constants when the distance between the object and the source is greater than or equal to a threshold distance ***(page 634, equation 11-104; and page 634, figure 11-18; and pages 633 - 634)***.

12.18.1. Regarding ***(page 634, equation 11-104; and page 634, figure 11-18; and pages 633 - 634)***; it would have been obvious to the ordinary artisan at the time of invention to store the current values as constants since the value of I_1 is merely substituted into equation 11-104, while the value of Z_L can be changed to calculate a new I_2.

12.19. calculating current values of the object using the constants when the distance between the object and the source is greater than or equal to a threshold distance ***(page 634, equation 11-104; and page 634, figure 11-18)***.

12.19.1. Regarding ***(page 634, equation 11-104; and page 634, figure 11-18)***; the value of I_1 in equation 11-104 is the constant determined in the previous step.

12.20. changing a relative position of the object and the source ***<u>(page 632, figure 11-16; and page 632, section 11-6.1, first paragraph)</u>***.

12.21. calculating current values of the object with the changed relative position using the constants when the distance between the object and the source is greater than or equal to a threshold distance ***<u>(page 632 –634, section 11-6.1; and page 634, figure 11-18; and page 634, equation 11-104)</u>***.

12.21.1. the approximation of $Z_{12} = 0$ is valid when the distance between the object and the source is greater than or equal to a threshold distance (**page 633, first paragraph**).

12.22. calculating the receiving characteristic of the object based on the current values of the object ***<u>(page 634, equation 11-104; and page 634, figure 11-18; the current I_2 is an receiving characteristic)</u>***.

12.23. Cheng does not specifically teach:

12.24. outputting the receiving characteristic of the object on an output device.

12.25. Nishino appears to teach:

12.26. outputting the receiving characteristic of the object on an output device (***<u>figure 5, element ST9 outputting to element 21</u>***).

12.27. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Nishino with the art of Cheng to obtain the invention as specified in claim 12.

13. **Examiner's Note:** Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the Applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner. The entire reference is considered to provide disclosure relating to the claimed invention.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

15. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russ Guill whose telephone number is 571-272-7955. The examiner can normally be reached from 9:30 AM – 6:00 PM Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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